Advanced Ceramics | Polartherm Boron Nitride Fillers





PolarTherm™ Thermally Conductive Fillers

Heat - it's one of the major enemies of today's electronic components and assemblies. It shortens service life and threatens reliability. Everyday the challenge grows greater as designers and fabricators are asked to produce assemblies that are smaller and faster, making the need for heat dissipation greater than ever before.

PolarTherm<sup>™</sup> Boron Nitride (BN) Fillers solve the problem. When used in a variety of polymeric materials, PolarTherm<sup>™</sup>'s heat dissipating capability helps extend the service life and enhance the reliability of electronic components and assemblies.



### PolarTherm<sup>™</sup> Fillers: The Cool Choice

Compare the thermal conductivity of PolarTherm<sup>TM</sup> Fillers to other fillers such as fused silica, aluminum oxide, and aluminum nitride. PolarTherm<sup>TM</sup> Boron Nitride outperforms these materials when used as a filler in polymeric materials. Some polymer materials with PolarTherm<sup>TM</sup> fillers have achieved thermal conductivity levels as high as 15 W/mK.

### **Beyond Conductivity: Other Advantages**



PolarTherm<sup>™</sup> Fillers meet today's electronic fabrication needs in other ways, too. They are excellent insulators with a dielectric constant of 3.9 which is especially important in today's smaller package designs. PolarTherm<sup>™</sup> Fillers are easy to work with because they are made from a soft, lubricious material that provides good flow properties at high loadings. Chemically inert, PolarTherm<sup>™</sup> material resists moisture and provides high volume resistivity (above 1015 ohm-cm).

# **Comparison of Filler Properties**

	BN	Al <sub>2</sub> O <sub>3</sub>	AIN	Fused SiO <sub>2</sub>
Thermal Conductivity W/mK @ 25°C	250-300	30	260	1.4
Dielectric Constant	3.9	9.7	8.8	3.8
Vacuum Resistivity ohm-cm	10 <sup>15</sup>	10 <sup>14</sup>	1014	10 <sup>14</sup>
Loss Tangent @ 1Mhz	<.0002	.0001	.0004	.0002
Knoop Hardness kg/mm²	11	1500	1200	500
Coeffcient of Expansion Linear, x 10 <sup>-6/o</sup> C	<1	6.7	4.4	0.5
Specific Heat J/kgK @ 25ºC	794	798	734	689
Theoretical Density g/cc	2.25	3.95	3.26	2.20

### Modified to meet your exact needs.

With over 40 years experience, Advanced Ceramics Corporation knows that different applications demand different solutions. That's why PolarTherm<sup>™</sup> Fillers are available in an unmatched variety of densities, surface areas, and particle sizes (from fine particles to large agglomerates). Powder surfaces can be modified for greater flowability at high loading levels.

You can specify the powder that will give you the precise combination of thermal conductivity, electrical insulation, flow properties and other characteristics that your application requires.

### **PolarTherm<sup>™</sup> Fillers**

Here is a partial list of available grades. Please contact A.C.C. for additional grades and specialty materials.

PolarTherm Grades	Surface Area (m2/g)	Average Particle Size (microns)
100 Series (Fine Hexagonal BN Powders)		
<u>PT110</u>	0.1 - 1	35 - 60
<u>PT112</u>	0.1 - 1	15 - 40
<u>PT120</u>	0.5 - 5	8 - 14
<u>PT130</u>	8	7 - 11
<u>PT131</u>	13	5 - 12
<u>PT132</u>	13	4 - 11
<u>PT140</u>	3 - 8	8 - 14
<u>PT160</u>	8 - 15	6 - 12
<u>PT180</u>	15 - 21	5 - 11
300 Series (Low Density Agglomerates)		
<u>PT350</u>	3 - 8	100 - 150
<u>PT360</u>	7	200
<u>PT370</u>	2	> 200
600 Series (High Density Agglomerates)		
<u>PT620</u>	10 Max.	16 - 30
<u>PT670</u>	.5 - 5	> 200

Note: All fillers are available with modified surfaces to improve workability at high loadings in epoxy systems. Surface modified fillers must be mixed into epoxy systems at 500 C to activate coating. To order, add  $\S"$  to the filler number (eg. PT120S).

Typical Purity Levels		
Cu, Al, Mg, Fe, K, Si	< 100 ppm (per element)	
Cl, S, Na	< 20 ppm (per element)	
Low alpha particle emissions	0.018counts/cm <sup>2</sup> -hr	
High Volume Resistivity	>10 <sup>15</sup> ohm-cm	
PolarTherm™ Fillers meet the industry's most exacting standards for purity and integrity.		

## **Immediate Delivery!**

As the world's largest producer of boron nitride fillers, only Advanced Ceramics Corporation has the production facilities to consistently meet any supply requirement. Whether you order PolarTherm<sup>™</sup> Fillers by the truckload, Advanced Ceramics delivers these high-quality fillers to your dock when you need them.

And, Advanced Ceramics facilities are ISO 9002 certified, your assurance that our commitment to quality is never ending.

#### **Excellent technical support.**

You have to deal with many variables when specifying a filler. Call on our experts for assistance in answering any of your questions. We do more than just fill out an order form.

#### **Preparing for tomorrow.**

The needs of the electronics industry are always changing. To keep up with new challenges, our researchers are constantly seeking ways to make PolarTherm<sup>TM</sup> Fillers even better. When tomorrow presents you with a new challenge, we'll be there to help.

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